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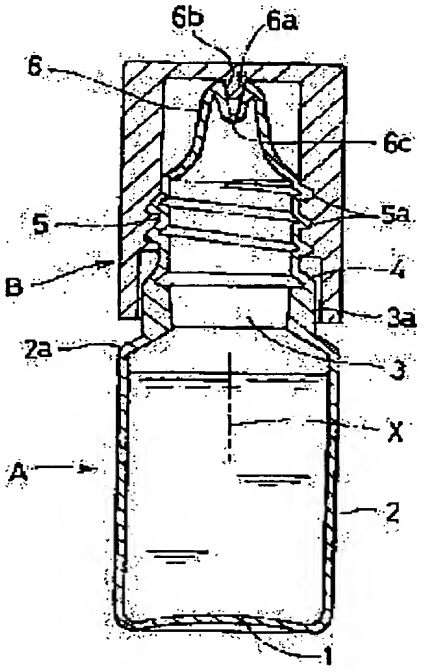
(54) EYEDROPPER AND METHOD OF MANUFACTURING IT

(57)Abstract:
PROBLEM TO BE SOLVED: To provide an eyedropper which can always surely make a fixed quantity of liquid to drop down when its main body is pressed without detracting the advantage in manufacturing cost of its bottle pack type main body.
SOLUTION: At the front end section of the main body A of an eyedropper in which a liquid is simultaneously packed in a hermetically sealed state when the main body A is molded and which is made of a thermoplastic material, a bottomed conical recessed section 6b having an inside diameter which becomes larger as going toward the front end side is formed. In addition, a small-diameter liquid injection hole 6c is formed through the bottom of the recessed section 6b so as to control the quantity of a droplet squeezed out of the main body A to a set value.



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* NOTICES *

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CLAIMS

[Claim(s)]
[Claim 1] The opening instillation container which has carried out penetration formation of the inlet of the minor diameter for controlling the amount of drops which a head side becomes depressed and forms the closed-end conic crevice where a bore serves as size in the point of the body of a container made from the thermoplastics with which the liquid is filled up into shaping and coincidence with the seal condition, and is extruded by the base of this crevice from the body of a container to a preset value.
[Claim 2] It is the opening instillation container which a head side became depressed and formed the closed-end conic crevice where a bore serves as size in the point of the body of a container made from the thermoplastics with which the liquid is filled up into shaping and coincidence with the seal condition, and is equipped with the configuration whose penetration formation on the base of said crevice is attained in the inlet of the minor diameter for controlling the amount of drops in which this hollow is extruded by the base of this crevice from the body of a container in that case to a preset value.
[Claim 3] The opening instillation container according to claim 1 or 2 with which the screw section for enabling screwing wearing of the desorption of a cap in the condition of sealing the crevice of this body of a container is really formed in said body of a container.
[Claim 4] The opening instillation container according to claim 1, 2, or 3 constituted by the range whose depth of said crevice is 2-7mm.
[Claim 5] the month by the side of the head of said crevice — the opening instillation container according to claim 1, 2, 3, or 4 constituted by the range whose path is 2-4mm.
[Claim 6] The manufacture approach of the opening instillation container which is the manufacture approach of an opening instillation container according to claim 1, 3, 4, or 5, carries out the pressure welding of the needlelike die which forms the convex die which fabricates said crevice, and said inlet, and fabricates it from a container axis to the point of the body of a container with which the liquid is filled up into shaping and coincidence with the seal condition.
[Claim 7] The manufacture approach of the opening instillation container which is the manufacture approach of an opening instillation container according to claim 2, carries out the pressure welding of the convex die which fabricates said crevice, and fabricates it from a container axis to the point of the body of a container with which the liquid is filled up into shaping and coincidence with the seal condition.
[Claim 8] The manufacture approach of an opening instillation container according to claim 6 or 7 of heating the part fabricated with said convex die at least to the temperature which is not buckled with a heating means before shaping.
[Claim 9] The manufacture approach of an opening instillation container according to claim 6 that said convex die and needlelike die fabricate a crevice and an inlet to the point of a container using the single die really formed.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to amelioration of the opening instillation container used for medical-application eye lotions, and the manufacture approach of that.
[0002]
[Description of the Prior Art] It is necessary to control the amount of instillation to a constant rate in medical-application eye lotions. As a common opening instillation container which can control this amount of instillation Inner fitting immobilization of the inside plug member of an injection-molded product is carried out at the tubed regio oralis of the fabricated body of a container. To this inside plug member While a head side forms the inlet of the minor diameter where a bore controls the amount of drops which penetrates in and abroad in the base center position of the closed-end conic crevice where it becomes size, and this crevice, and which extrudes from the body of a container What carried out screwing wearing of the cap of the injection-molded product which equipped the male screw section formed in the peripheral face of the tubed regio oralis of said body of a container with the plug-like projection for sealing the closed-end cone-like crevice of an inside plug member in the state of fitting is used widely.
[0003] When based on this opening instillation container, by existence with the inlet of the minor diameter by which penetration formation was carried out to the base center position of the closed-end conic crevice formed in the inside plug member, and this crevice The metal mold for injection molding three members of what can take to press actuation of the body of a container, and can always carry out dropping administration of the liquid of a constant rate certainly to each **, respectively is required, and washing / sterilization activity of each part material is needed, and a manufacturing cost becomes high.
[0004] On the other hand, the shaping container is really used considering the manufacturing cost as a container which may make lowering and the function as an opening instillation container hold. the body of a container made from thermoplastics (a common name —) with which it sets in this container, and blow molding or the vacuum forming, simultaneously the liquid are filled up with and enclosed The cap which has really formed the needlelike projection for carrying out penetration formation of the inlet in the point of the body of a container is screwed in the male screw section formed in the peripheral face by the side of a point among the bodies of a container of a bottle pack mold free [desorption]. The screwing actuation by the side of a bundle lump deeper one step than the usual closedown location of this cap constituted so that penetration formation of the inlet might be carried out by the needlelike projection of a cap at the point of the body of a container.
[0005]
[Problem(s) to be Solved by the Invention] Although it has the advantage which can attain cheap-ization of a manufacturing cost with the opening instillation container of an above-mentioned bottle pack mold as compared with the opening instillation container using the inside plug member which it injection molded If the screwing control input by the side of the bundle lump from the usual closedown location of a cap is not appropriately performed in order to form an inlet, breaking through the point of the body of a container by the needlelike projection of a

cap, the configuration and magnitude of an inlet may become uneven and fluctuation of the amount of drops extruded from the body of a container may be invited.
[0006] Moreover, if superfluous actuation of the cap is more nearly usually than a closedown location carried out at a bundle lump side after penetration formation of the inlet is carried out at the point of the body of a container, an inlet will be extended at every the superfluous bundle lump actuation of the by the needlelike projection of a cap, and the amount of drops extruded from the body of a container may increase gradually.
[0007] Therefore, although sufficient explanation about the operation of an opening instillation container was needed, since screwing actuation may have been suitably carried out to a bundle lump side, and a cap may have been punched or bundle lump actuation of the cap may have been superfluously carried out even if it compares and performs sufficient explanation, it was difficult [it] to avoid certainly the activity which made the mistake in being above.
[0008] In view of the above-mentioned actual condition, it succeeds in this invention. The 1st main technical problem Without spoiling a predominance in the manufacturing-cost side which is the advantage which the body of a container of a bottle pack mold has It is in the point of offering the opening instillation container which can take to press actuation of the body of a container, and can always carry out dropping administration of the liquid of a constant rate certainly, and the 2nd main technical problem is in the point of offering the manufacture approach which can promote cheap-ization of a manufacturing cost.
[0009]
[Means for Solving the Problem] The point which carried out penetration formation of the inlet of the minor diameter for control the amount of drops which becomes depressed , forms the closed-end conic crevice where a bore serves as size , and is extrude from the body of a container on the base of this crevice for a head side at a preset value has the description configuration of the opening instillation container by claim 1 of this invention at the point of the body of a container made from the thermoplastics with which the liquid is fill up into shaping and coincidence with the seal condition . According to the above-mentioned description configuration, the body of a container made from thermoplastics (body of a container of a bottle pack mold) with which the liquid is filled up into shaping and coincidence by blow molding, a vacuum forming, etc. with the seal condition is used. Although a head side forms in the point of this body of a container directly the inlet of the closed-end conic crevice which a bore becomes with size, and the minor diameter for controlling the amount of drops extruded from the body of a container at a preset value, therefore It can both take to press actuation of the body of a container by existence with a closed-end conic crevice and the inlet of a minor diameter as if there is little metal mold for manufacturing the body of a container as compared with the opening instillation container using the inside plug member which it injection molded and it ends, and dropping administration of the liquid of a constant rate can always be carried out certainly. Therefore, dropping administration of the liquid of a constant rate can always be carried out certainly, without spoiling a predominance in the manufacturing-cost side which is the advantage which the body of a container of a bottle pack mold has, since the closed-end conic crevice for making the point of the body of a container of a bottle pack mold demonstrate an inside plug function and the inlet of a minor diameter are only formed. A point especially important about the opening instillation container by this invention is forming a crevice with the configuration which can carry out penetration formation of the inlet of the minor diameter for controlling the amount of drops to a preset value in the point of the body of a container made from thermoplastics filled up into the liquid with the seal condition by shaping and coincidence. It is a thing also containing the opening instillation container as a semifinished product with which the crevice [like / so] was formed within the limit of this invention from this. The configuration of such an opening instillation container To the point of the body of a container made from the thermoplastics with which the liquid is filled up into shaping and coincidence with the seal condition so that it may indicate to claim 2 The head side became depressed and formed the closed-end conic crevice where a bore serves as size, and this hollow is equipped with the description of having the configuration whose penetration formation on the base of said crevice is attained in the inlet of the minor diameter for controlling the amount of drops extruded by the

base of this crevice from the body of a container to a preset value, in that case.
[0010] The point that the screw section for enabling screwing wearing of the desorption of the cap which seals the crevice of this body of a container on said body of a container is really formed has the description configuration of the opening instillation container by claim 3 of this invention. According to the above-mentioned description configuration, since the screw section for carrying out screwing wearing of the cap can also be formed in shaping of the body of a container, and coincidence, cheap-ization of a manufacturing cost can be promoted.
[0011] The description configuration of the opening instillation container by claim 4 of this invention has the depth of said crevice in the point constituted by the range which is 2-7mm. According to the above-mentioned description configuration, it is desirable that it is in the range of 5-7mm from a technical side, such as to obtain the yield and the stable inside plug function, although the deeper possible one of the depth of said crevice is desirable, but it is about 6mm most preferably. If this crevice depth becomes smaller than a suitable value, the problem that the liquid of that liquid reservoir jumps out through an inlet by the pressure produced when the point of that crevice, i.e., an inlet, is covered and it has a container by hand with the liquid with which the annular space in the container formed in the perimeter of a crevice (liquid reservoir) is covered with surface tension will arise. Moreover, if this crevice depth becomes larger than a suitable value, it will become easy to produce the defect that a crack goes into a crevice at the time of the process which forms this crevice. The optimum solution with which such opposite conditions are filled is 6mm. However, since it is few in the amount of a liquid reservoir and the depth of a crevice is not so required to be a drug solution with small surface tension, the depth of a crevice can also be designed shallowly.
[0012] the description configuration of the opening instillation container by claim 5 of this invention -- the month by the side of the head of said crevice -- a path is in the point constituted by the range which is 2-4mm. According to the above-mentioned description configuration, according to the acidity or alkalinity (surface tension, viscosity) of the liquid with which the body of a container is filled up, it adjusts within the limits of 4.0mm of phi2.0 mm-phi. the case where it is acidity or alkalinity with large surface tension in order to fixed-ize one drop measure (it adjusts to the object within the limits of the 25-50-micron liter per 1 in all drop measure) -- said month -- the case where a path is made small and surface tension is small acidity or alkalinity -- said month -- a path is enlarged.
[0013] The point which carries out the pressure welding of the needlelike die which forms shaping, the convex die which fabricates said crevice to the point of the body of a container with which the liquid is filled up into coincidence with the seal condition, and said inlet, and fabricates it from a container axis has the description configuration of the manufacture approach of the opening instillation container by claim 6 of this invention. According to the above-mentioned description configuration, the body of a container made from thermoplastics (body of a container of a bottle pack mold) with which the liquid is filled up into shaping and coincidence by blow molding, a vacuum forming, etc. with the seal condition is used. Although a head side forms in the point of this body of a container directly the inlet of the closed-end conic crevice which a bore becomes with size, and the minor diameter for controlling the amount of drops extruded from the body of a container at a preset value, therefore It can both take to press actuation of the body of a container by existence with a closed-end conic crevice and the inlet of a minor diameter as if there is little metal mold for manufacturing the body of a container as compared with the opening instillation container using the inside plug member which it injection molded and it ends, and dropping administration of the liquid of a constant rate can always be carried out certainly. And since the pressure welding of the needlelike die which forms the convex die which fabricates said crevice, and said inlet is only carried out from a container axis, it is also possible to form a closed-end conic crevice and the inlet of a minor diameter, transporting many bodies of a container. Therefore, since it is possible to process it into the point of the body of a container of a bottle pack mold, only forming the closed-end conic crevice for demonstrating an inside plug function and the inlet of a minor diameter, and transporting many bodies of a container moreover, the opening instillation container which can always carry out dropping administration of the liquid of a constant rate certainly can be advantageously manufactured in respect of a

manufacturing cost. Moreover, as claim 7 shows, the manufacture approach for the opening instillation container as a semifinished product with which the crevice by this invention mentioned above is formed is characterized by carrying out the pressure welding of the convex die which fabricates said crevice, and fabricating it from a container axis, to the point of the body of a container with which the liquid is filled up into shaping and coincidence with the seal condition, and has the above-mentioned operation effectiveness.

[0014] The point of heating the part fabricated with said convex die at least to the temperature which is not buckled with a heating means before shaping has the description configuration of the manufacture approach of the opening instillation container by claim 8 of this invention. It is ****** to aim at the improvement in the process tolerance of a crevice and the improvement of the yield which are formed in the point of said body of a container according to the above-mentioned description configuration.

[0015] The description configuration of the manufacture approach of the opening instillation container by claim 9 of this invention has said convex die and needlelike die in the point which fabricates a crevice and an inlet to the point of a container using the single die really formed. According to the above-mentioned description configuration, since a closed-end conic crevice and the inlet of a minor diameter can be formed with a single die, improvement in manufacture efficiency and simplification of a manufacturing facility can be attained.

[0016]

[Embodiment of the Invention] The [1st operation gestalt] Drawing 1 shows the opening instillation container of this invention mainly used for medical application, and consists of caps B screwed in male screw section 5a formed in the peripheral face of the screw cylinder part 5 of the body A of a container made from thermoplastics, and this body A of a container with the flexibility with which the drug solution of the specified quantity was filled up into blow molding or a vacuum forming, and coincidence free [attachment and detachment].

[0017] The pars basilaris ossis occipitalis 1 of the circle configuration to which said body A of a container curves inside, and the bell shape drum section 2 which stands in a row in the periphery of this, The neck 3 of the shape of a cylinder which follows shoulder part 2a of this drum section 2, and the step 4 in a circle which bulges in the method of the outside of the diameter direction from the upside location of this neck 3, While consisting of a screw cylinder part 5 equipped with male screw section 5a which follows a this upside, and a pouring-in cylinder part 6 equipped with pouring-in opening 6a which follows a this upside Tabular rib 3a which meets in the direction of container axis X is really formed in each of the part which are two circumferencial directions of said neck 3, and carries out phase opposite on both sides of the container axis X.

[0018] Inlet 6c of a controllable minor diameter is formed in the preset value at the pouring-in cylinder part 6 of said body A of a container in the amount of drops by which closed-end conic crevice 6b from which a bore serves as size becomes depressed, is formed, takes the pouring-in opening 6a side to the press actuation by the fingertip of said drum section 2 in the base of this crevice 6b, and it is extruded from the body A of a container.

[0019] the depth of said crevice 6b -- the range of 2-7mm -- desirable -- the range of 5-7mm -- while constituting in 6mm most preferably, the aperture (month path) of said pouring-in opening 6a is adjusted in the range of 4.0mm of phi2.0 mm-phi according to the acidity or alkalinity (surface tension, viscosity) of a drug solution. In order to fixed-ize one drop measure (it adjusts to the object within the limits of the 25-50-micron liter per 1 in all drop measure), when it is acidity or alkalinity with large surface tension, aperture of said pouring-in opening 6a is made small, and when surface tension is small acidity or alkalinity, aperture of said pouring-in opening 6a is enlarged.

[0020] Furthermore, said inlet 6c is formed using the needle of the path of the range of 0.8mm of phi0.1 mm-phi. Although the smaller one of the path of this needle is desirable and about phi0.2mm is the most desirable, since it will become difficult technically if it is not much small, the needle of the range of 0.6mm of phi0.4 mm-phi is actually used for it.

[0021] When there are polyethylene, polyethylene polypropylene, polypropylene, polyethylene ethylene terephthalate, a polycarbonate, etc. and it screws in male screw section 5a of the body A of a container at said cap B as thermoplastics which is a component of said body A of a

container, the plug-like projection 8 which carries out [the projection] inner fitting to crevice 6b of this body A of a container, and is sealed is really formed.
[0022] Since it is common knowledge in the technical field concerned, the manufacture approach of the body A of a container before said crevice 6b and inlet 6c are formed is explained briefly. The main shaping metal mold 11 of the couple equipped with the 1st cavity 10 for fabricating the part of the range from the step 4 of said body A of a container in a circle to a pars basilaris ossis occipitalis 1 as shown in drawing 2 (b), Where aperture actuation is carried out, the subshaping metal mold 13 of the couple equipped with the 2nd cavity 12 for fabricating the screw cylinder part 5 and the pouring-in cylinder part 6 of the body A of a container From the extruder head 14 arranged in those upper parts, Bali Son 15 of the predetermined die length which is a hollow tube-like fritting heat-of-fusion plasticity ingredient long and slender is extruded along a perpendicular direction through between both the metal mold 11 and 13.
[0023] Next, as shown in drawing 2 (b), while carrying out closing actuation of said main shaping metal mold 11, it fabricates, expanding Bali Son 15 according to an entrainment operation or a vacuum operation of the compressed air along with shaping side 11a of the main shaping metal mold 11. As shown in drawing 2 (Ha), the liquid (drug solution) of the specified quantity is filled up with this condition from the drugs supply pipe 16. While carrying out closing actuation of said subshaping metal mold 13 as shown in drawing 2 (2) after this liquid restoration process is completed, it fabricates expanding Bali Son 15 according to an entrainment operation or a vacuum operation of the compressed air along with shaping side 13a of the subshaping metal mold 13, and shaping and the liquid with which coincidence was filled up are sealed (enclosure).
[0024] Next, the manufacture approach of the three-way-type type which forms closed-end conic crevice 6b and inlet 6c of a minor diameter in the pouring-in cylinder part 6 which is blow molding or a point of the body A of a container by which the vacuum forming was carried out is explained like ****, respectively. The metal convex die 20 which fabricates said closed-end conic crevice 6b by the manufacture approach of the 1st method shown in [manufacture approach of 1st method] drawing 3 (b) - (d), and the metal needlelike die 21 which forms said inlet 6c are used. Cone-like shaping projection 20B by which said convex die 20 fabricates closed-end conic crevice 6b to the point of anchoring shaft 20A, Shaping side 20C of the shape of a bowl which fabricates the peripheral face of the pouring-in cylinder part 6 of the body A of a container (the shape of a temple bell) is formed, and it is constituted, and said needlelike die 21 forms in the point of anchoring shaft 21A needlelike shaping projection 21B whose inlet 6c formation a minor diameter does, and is constituted.
[0025] And in the manufacture approach of this 1st method, as shown in drawing 3 (b), a part of pouring-in cylinder part 6 which is a point of the body A of a container is heated at a room temperature or 70 degrees C - 150 degrees C with the 1st heating means C, such as warm air or a halogen lamp, and a laser beam. Although whenever [stoving temperature] is based also on the construction material of the body A of a container, and a configuration, the temperature which the head of the body A of a container softens for a while is desirable. In the case where the thermoplastics of the body A of a container is a soft resin ingredient like polyethylene, since a point is buckled if it does not heat, it is necessary to heat the part fabricated with said convex die 20 at least to the temperature which is not buckled with the 1st heating means C before shaping. However, in the case of the resin ingredient and the configuration where a buckling can be borne (i.e., when it can be equal to press from [of the convex die 20] container axis X), it can fabricate also at a room temperature.
[0026] Next, as shown in drawing 3 (b), before a part of pouring-in cylinder part 6 of the body A of a container heated with the 1st heating means C gets cold, said convex die 20 is pressed from container axis X, and the pouring-in opening 6a side fabricates closed-end conic crevice 6b which a bore becomes with size to the pouring-in cylinder part 6 of the body A of a container. At this time, the weld flash at the time of the blow molding which projects in the peripheral face of the pouring-in cylinder part 6 of the body A of a container is removable with bowl-like shaping side 20C of said convex die 20.
[0027] Said convex die 20 very thing is doubled with the configuration and thickness of the pouring-in cylinder part 6 of the body A of a container fabricated, and carries out temperature

control in 150 degrees C from a room temperature. In consideration of cooling solidification at the head of the pouring-in cylinder part 6, the lowest possible temperature is desirable as whenever [stoving temperature]. It enables it to exchange this convex die 20 simply according to the acidity or alkalinity of the liquid with which it fills up.

[0028] Next, as shown in drawing 3 (Ha) and (d), inlet 6c of a controllable minor diameter is formed in a preset value for the amount of drops which presses the needlelike die 21 from container axis X, takes to the press actuation by the fingertip of a drum section 2 to the base mid gear of crevice 6b formed in the pouring-in cylinder part 6 of said body A of a container, and is extruded from the body A of a container. In the formation process of inlet 6c by needlelike projection 21B of this needlelike die 21, the approach of working needlelike projection 21B with a room temperature, and the method of working, after heating needlelike projection 21B are proposed. the configuration of inlet 6c which forms the approach which should be adopted, and the configuration of crevice 6b — it is chosen, corresponding [being carried out and] to conditions, such as a configuration of others of a container, and construction material, a manufacturing cost. As whenever [stoving temperature / in the case of requiring heating], the temperature of the needlelike die 21 to which the resin of container construction material fuses needlelike projection 21B at least, and the range of 130 degrees C - 180 degrees C are suitable.

[0029] The 2nd heating means D, such as high-frequency induction heating, a halogen lamp, and warm air, perform heating of the needlelike die 21, and anchoring shaft 21A which is the root of the needlelike die 21 is constituted so that it may cool with the cooling means E, such as a water jacket and the compressed air. And when said needlelike die 21 is cooled by even predetermined temperature, this needlelike die 21 is sampled along the direction of container axis X from the pouring-in cylinder part 6 of the body A of a container fabricated by the predetermined configuration.

[0030] Said needlelike die 21 may perform plating or Teflon (trademark) coating, and surface treatment of special plating to a front face in order to improve the detachability of resin, and a mold-release characteristic. As for this surface treatment, what does not exfoliate simply [can bear an elevated temperature and] is desirable.

[0031] By the manufacture approach of the 2nd method shown in [manufacture approach of 2nd method] drawing 4 (b) - (d), the metal convex die 20 which fabricates said closed-end conic crevice 6b, and the metal needlelike die 21 which forms said inlet 6c are used like the 1st method. Said convex die 20 forms in the point of anchoring shaft 20A only cone-like shaping projection 20B which fabricates closed-end conic crevice 6b, and is constituted. Moreover, said needlelike die 21 Needlelike shaping projection 21B which forms inlet 6c of a minor diameter in the point of anchoring shaft 21A, Shaping side 21C of the shape of a bowl which fabricates the peripheral face of the pouring-in cylinder part 6 of the body A of a container (the shape of a temple bell) is formed, it is constituted, and root partial 21b of said needlelike shaping projection 21B is further formed in the cone configuration in alignment with crevice 6b formed in said cone-like shaping projection 20B.

[0032] Although it constituted from the 1st method so that the weld flash at the time of the blow molding which projects in the peripheral face of the pouring-in cylinder part 6 of the body A of a container at the time of shaping by the convex die 20 might be removed as shown in drawing 3 (b) It constitutes from this 2nd method so that the weld flash at the time of the blow molding which projects in the peripheral face of the pouring-in cylinder part 6 of the body A of a container at the time of shaping by the needlelike die 21 may be removed, as shown in drawing 4 (Ha), and the other configuration is the same as that of the 1st method.

[0033] The metal single die 22 with which the convex die which fabricates said closed-end conic crevice 6b by the manufacture approach of the 3rd method shown in [manufacture approach of 3rd method] drawing 5 (b) - (d), and the needlelike die which forms said inlet 6c are really formed is used. While this single die 22 forms cone-like shaping projection 22B which fabricates closed-end conic crevice 6b to the point of anchoring shaft 22A, and shaping side 22D of the shape of a bowl which fabricates the peripheral face of the pouring-in cylinder part 6 of the body A of a container (the shape of a temple bell) Needlelike shaping projection 22C which forms inlet 6c of a minor diameter at the head of said cone-like shaping projection 22B is really formed by

concentric voice, and it is constituted.
[0034] By the manufacture approach of this 3rd method, as shown in the drawing 5 (**) and (**), the head side of the pouring-in cylinder part 6 of the body A of a container is not heated, but after getting cold even in a room temperature, needlelike shaping projection 22C which forms inlet 6c of a minor diameter is pierced to this side which forms crevice 6b to the head of the pouring-in cylinder part 6 of the body A of a container also with the fabricated temperature (70 degrees C - 80 degrees C).
[0035] Needlelike shaping projection 22C which was able to be pierced at the head of the pouring-in cylinder part 6 of the body A of a container is heated by the high-frequency-induction-heating means which is an example of the 2nd heating means D, as shown in drawing 5 (Ha). the range which near the temperature which a container ingredient fuses is desirable as for whenever [stoving temperature], and is usually 120 degrees C - 200 degrees C -- it is preferably controlled near 160 degree C. The single die 22 equipped with needlelike shaping projection 22C and cone-like shaping projection 22B is pushed in 8mm from 2mm, being heated as shown in drawing 5 (d), and it fabricates closed-end conic crevice 6b, pressurizing so that the head side of the pouring-in cylinder part 6 of the body A of a container may be compressed from container axis X.
[0036] Although the deeper one of pushing of cone-like shaping projection 22B of this single die 22 is desirable, it considers as the range of 5-7mm from a technical issue. At this time, a vent hole may be established in the single die 22 so that air bubbles may not go into the point of the pouring-in cylinder part 6 of the fused body A of a container (since the resin of a point is fused thoroughly, deflation is the need).
[0037] As shown in drawing 11 (b), anchoring shaft 22A which is the root of the single die 22 is constituted so that it may cool with the cooling means E, such as a water jacket and the compressed air. And when said single die 22 is cooled by even predetermined temperature, this single die 22 is sampled along the direction of container axis X from the pouring-in cylinder part 6 of the body A of a container fabricated by the predetermined configuration.
[0038] Said single die 22 may perform plating or Teflon coating, and surface treatment of special plating to a front face in order to improve the detachability of resin, and a mold-release characteristic. As for this surface treatment, what does not exfoliate simply [can bear 280 degrees C or more, and] is desirable. And closed-end conic crevice 6b by the side of the point of the body A of a container fabricated by which manufacture approach of the 1st method to the 3rd method and inlet 6c of a minor diameter have a function as an inside plug. Improving prevention of air bubbles biting and the piece of air bubbles is mentioned in one stable drop measure and one drop of drop. Moreover, also in the 2nd method and the 3rd method which were mentioned above, in the formation process of needlelike projection 21B or inlet 6c to 22C Depend, as mentioned above, it is also possible [after heating needlelike projection 21B or 22C with the 2nd heating means D, it was working, but] not to perform such heating depending on the case, but for inlet 6c to form using needlelike projection 21B of a room temperature condition or 22C.
[0039] Next, the manufacture machine used for the manufacture approach of said 1st method to the 3rd method is explained. The conveyance supply means F which carries out installation conveyance of blow molding or many bodies A of a container by which the vacuum forming was carried out in accordance with a straight line-like supply path as shown in drawing 6 - drawing 11 A container feed means G to convey the body A of a container by which installation conveyance has been carried out in accordance with a radii-like feed path from a top thing with this conveyance supply means F It pinches near [which has been fed from this container feed means G] the body A of a container a shoulder or near it. A pinching migration means H to transport in accordance with a radii-like pinching migration path in the horizontal direction and the condition of having prevented migration in a lower part at least of this body A of a container A container delivery means J to receive the body A of a container after processing transported in accordance with the circular pinching migration path of this pinching migration means H, and to transport in accordance with a radii-like delivery path is established.
[0040] While a 1st heating means C to heat a part of pouring-in cylinder part 6 which is a point

of the body A of a container is arranged by said container feed means G, moreover, for said pinching migration means H A change means K to change the convex die 20, the needlelike die 21, or the single die 22 with which it is selectively equipped free [******] to the point of the body A of a container by which pinching migration is carried out with this pinching migration means H to a position in readiness and a fabricating-operation location, and to operate it The inside of the body A of a container by which pinching migration is carried out by the pinching pawl of the couple of said pinching migration means H, The alignment means L changed to the condition of being attached outside from container axis X to the part by the side of the head which projects from the pinching pawl of a couple, and the standby condition from which it was made to secede is arranged. Furthermore, the high-frequency-induction-heating means D which is an example of the 2nd heating means which heats the needlelike die 21 or the single die 22 which is a die in the middle of is established. [the circular pinching migration path of said pinching migration means H]

[0041] actuation sprocket which can be freely rotated to a machine frame 24 by the circumference of the axis-of-abscissa heart interlocked with the electric motor 26 to the longitudinal direction both ends of the mounting **** conveyance frame 25 as said conveyance supply means F is shown in drawing 6 (not shown) While winding the endless conveyance object 29 which prepares the driven sprocket wheel (not shown) which can rotate freely by the circumference of the axis-of-abscissa heart, covers said both sprockets, and carries out installation conveyance of many bodies A of a container The conveyance guide plate 30 of a left Uichi pair which carries out conveyance advice of the body A of a container on the endless conveyance object 29 is formed, and it is constituted.

[0042] As said container feed means G is shown in drawing 6 and drawing 7 , at the periphery edge of the actuation rotor plate 34 by which is interlocked with an electric motor 33 and an actuation revolution is carried out by the circumference of the axis-of-ordinate heart While the top body A of a container sent out from said conveyance supply means F forms two or more concave attaching parts 35 entered and held at constant pitch along with a circumferencial direction The installation guide plate 36 which catches the pars basilaris ossis occipitalis of the body A of a container held in said each attaching part 35, and carries out migration advice, and the migration guide 37 which prevents the ejection migration to the method of the outside of the radius-of-gyration direction of the body A of a container held in said each attaching part 35 are formed, and it is constituted.

[0043] Said 1st heating means C is used only at the time of manufacture of the 1st method and the second method which were mentioned above, and is constituted as follows. As shown in drawing 6 and drawing 7 , namely, the inside of the actuation rotor plate 34 of said container feed means G, To each of the part (with the drawing concerned, it simplifies and only one place is indicated) corresponding to each attaching part 35 Where migration energization is carried out, while forming the rise-and-fall frame 40 which equipped this actuation rotor plate 34 with the rise-and-fall guide shafts 40a and 40b of the couple which slides in the vertical direction along with breakthrough 34a of the couple by which penetration formation was carried out in a descent side by the compression coil spring 41 The thermal insulation plate 42 which can be attached outside free [desorption] is attached in the upper part of each of said rise-and-fall frame 40 from container axis X to a part for the bottom flank of the pouring-in cylinder part 6 of the body A of a container held at the attaching part 35.

[0044] moreover, at the supporter material 44 by the side of the machine frame 24 which carries out a response location on the rotation migration locus of the roller 43 formed in the lower part of each of said rise-and-fall frame 40 When it feeds into the container delivery location to the pinching migration means H and is conveyed from the container supply location of the conveyance supply means F, When it is made to descend to the thermal insulation operation position in which outer fitting of said thermal insulation plate 42 was carried out to a part for the bottom flank of the pouring-in cylinder part 6 of the body A of a container, and returns to a container supply location and is conveyed from a container delivery location, The cam member 45 which raises the standby position which resisted the elastic stability of said compression coil spring 41, and estranged the thermal insulation plate 42 up is attached free [height control].

[0045] Furthermore, the hot blast supply pipe 46 which supplies 200 degrees C - 500 degrees C hot blast is formed in each of the part corresponding to each attaching part 35 among the actuation rotor plates 34 of said container feed means G to the crowning of the pouring-in cylinder part 6 which is a point of the body A of a container held at each attaching part 35.
[0046] Said pinching migration means H is the periphery edge of the actuation rotor plate 51 by which is interlocked with an electric motor 50 and an actuation revolution is carried out by the circumference of the axis-of-ordinate heart, as shown in drawing 6 , drawing 8 , and drawing 10 . To and two or more each (with the drawing concerned, it simplifies and only one place is indicated) which separated predetermined spacing to the hand of cut The actuation shaft 42 of a couple which can rotate freely by the circumference of the axis-of-ordinate heart parallel to the revolving-shaft heart of the actuation rotor plate 51 is supported. In the upper bed section of both the actuation shaft 42 While attaching the pinching pawl 43 of the couple equipped with pinching side 53a of a semicircle arc for pinching in the state of fitting horizontally to the neck 3 used as the circular-sulcus section of the body A of a container Outer fitting immobilization of the gear 54 which carries out engagement linkage mutually is carried out, and the fluid cylinder 56 which carries out closing motion actuation of the pinching pawl 43 of said couple between the operating arm 55 which fixed in the soffit section of one actuation shaft 42, and the actuation rotor plate 51 side is further constructed over said both actuation shaft 42.
[0047] Moreover, the installation sliding guide plate 57 which carries out sliding advice of the pars basilaris ossis occipitalis 1 of the body A of a container by which pinching migration is carried out at said both pinching pawl 43 in the state of installation, and the migration guide member 58 which prevents the ejection migration to the method of the outside of the radius-of-gyration direction of the body A of a container by which pinching migration is carried out at said both pinching pawl 43 are prepared.
[0048] and where the neck 3 of the body A of a container is pinched by the pinching pawl 43 of said couple Since it is in the horizontal direction and the condition of having prevented migration in a lower part at least of this body A of a container While alignment precision with the convex die 20, the needlelike die 21, or the single die 22 with which the body A of a container and said change means K are equipped free [******] becomes high Lowering of the process tolerance of closed-end conic crevice 6b resulting from the elastic deformation in the direction of container axis X of the body A of a container accompanying press of a die and inlet 6c of a minor diameter can be controlled.
[0049] As said change means K is shown in drawing 8 and drawing 9 , the inside of the actuation rotor plate 51, To two or more each (with the drawing concerned, it simplifies and only one place is indicated) corresponding to each ******** 43 The movable frame 60 by which both-way migration is carried out is arranged in the radius-of-gyration direction and the vertical direction. To two places of the radius-of-gyration direction of head side anchoring section 60A of this movable frame 60 While attaching two holder cylinder axes 62 which went caudad and were equipped with shafting arrival opening which carries out opening free [desorption] through a nut 63, to shafting arrival opening of each of said holder cylinder axis 62 Screwing wearing of the nut 61 which holds selectively anchoring shaft 20A of the convex die 20, anchoring shaft 21A of the needlelike die 21, or anchoring shaft 22A of the single die 22 free [a replacement] has been carried out. moreover, for the rise-and-fall block 64 held free [sliding], two level slide shafts 60B of said good repere mobile 60 The vertical slide shafts 65 and 66 with which two die length which slides free [rise and fall] to the actuation rotor plate 51 differs are extended caudad. Among those, while connecting the soffit section of the long vertical slide shaft 65 with the rise-and-fall connection object 67 which can slide freely in accordance with the rise-and-fall guide shaft 68 of the couple in which it was prepared by the machine frame 24 The screw shaft 70 screwed in the crosswise mid gear of said rise-and-fall connection object 67 from the upper and lower sides The electric motor 69 fixed to the machine frame 24 is interlocked with, and the hydrostatic pressure cylinder 71 which makes the slide migration of the movable frame 60 carry out in the radius-of-gyration direction to said rise-and-fall block 64 is further attached in said actuation rotor plate 51.
[0050] The axis of the 1st holder cylinder axis 62 by the side of the short length located in the

method of the inside of the radius-of-gyration direction among said both holder cylinder axes 62 It is constituted so that it may agree with the axis X of the body A of a container pinched by the pinching pawl 43 of a couple. In carrying out shaping actuation of the convex die 20, the needlelike die 21, or the single die 22 with which the 2nd holder cylinder axis 62 by the side of the long picture located in the method of the inside of the radius-of-gyration direction was equipped selectively You carry out actuation control of said hydrostatic pressure cylinder 71, and the axis of the 2nd holder cylinder axis 62 makes it slide to the location which agrees with the axis X of the body A of a container pinched by the pinching pawl 43 of a couple.

[0051] Moreover, in carrying out shaping actuation of the convex die 20, the needlelike die 21, or the single die 22 with which said both holder cylinder axis 62 was equipped selectively, actuation control of said electric motor 69 is carried out, and only the specified quantity drops the movable frame 60, and from a position in readiness, a die is changed to a fabricating-operation location and it operates it.

[0052] As said alignment means L is shown in drawing 8 and drawing 11 , in the upper part of the movable tube-like object 75 sheathing of the slide migration of was made free in accordance with said vertical slide shafts 65 and 66 While attaching the **** annular solid 76 which has formed fitting hole 76a attached outside from container axis X to the screw cylinder part 5 of the body A of a container pinched by the pinching pawl 43 of a couple Between said movable tube-like object 75 and machine frame 24 sides, the hydrostatic pressure cylinder 77 which said **** annular solid 76 is changed [cylinder] to the alignment location which fits into the screw cylinder part 5 of the body A of a container, and the position in readiness which the upper part was made to estrange, and operates it is attached.

[0053] As shown in drawing 11 (b), while the water jacket 80 which constitutes the cooling means E is formed, the feed water communication trunk 81 which supplies cooling water to said water jacket 80, and the wastewater communication trunk 82 which discharges the cooling water in a water jacket 80 are formed in each of said both holder cylinder axis 62.

[0054] And it pinches near [where the liquid is filled up into shaping and coincidence with the seal condition like the above-mentioned] the body A of a container a shoulder or near it. A pinching migration means H to transport in accordance with a path in the horizontal direction and the condition of having prevented migration in a lower part at least of this body A of a container When a change means K to change the needlelike die 21 which forms the convex die 20 which fabricates said crevice 6b with this pinching migration means H to the point of the body A of a container by which pinching migration is carried out, and said inlet 6c to a position in readiness and a fabricating-operation location, and to operate it is established, the following operation and effectiveness are done so.

[0055] Namely, the body A of a container made from thermoplastics (body of a container of a bottle pack mold) with which the liquid is filled up into shaping and coincidence by blow molding, a vacuum forming, etc. with the seal condition is used. Although a head side forms in the point of this body A of a container directly closed-end conic crevice 6b which a bore becomes with size, and inlet 6c of the minor diameter for controlling the amount of drops extruded from the body A of a container at a preset value, therefore It can both take to press actuation of the body A of a container by existence with closed-end conic crevice 6b and inlet 6c of a minor diameter as if there is little metal mold for manufacturing the body of a container as compared with the opening instillation container using the inside plug member which it injection molded and it ends, and dropping administration of the liquid of a constant rate can always be carried out certainly.

[0056] And the point of the body A of a container by which pinching migration is carried out with said pinching migration means H is received. In case the convex die 20 and the needlelike die 21 are changed to a fabricating-operation location, are operated from a position in readiness and closed-end conic crevice 6b and inlet 6c of a minor diameter are formed, it pinches near the body A of a container a shoulder or near it with the pinching migration means H. the horizontal direction of this body A of a container — and, while alignment precision with the body A of a container, the convex die 20, and the needlelike die 21 becomes high, since migration in a lower part is prevented at least Lowering of the process tolerance of closed-end conic crevice 6b resulting from the elastic deformation in the direction of container axis X of the body A of a

container and inlet 6c of a minor diameter can be controlled.
[0057] Therefore, cheap-ization of the manufacturing cost which is the advantage which the body A of a container of a bottle pack mold has can be promoted more, aiming at improvement in the process tolerance of closed-end conic crevice 6b for taking to press actuation of the body A of a container, and always carrying out dropping administration of the liquid of a constant rate certainly, and inlet 6c.
[0058] Moreover, when the alignment means L changed to the condition of being attached outside from container axis X like the above-mentioned to the part by the side of the head which projects from the pinching pawl 53 among the bodies A of a container by which pinching migration is carried out by the pinching pawl 53 of said pinching migration means H, and the standby condition from which it was made to secede is established, the following operation and effectiveness are done so.
[0059] To the part by the side of the head of the body A of a container pinched by the pinching pawl 53 of said pinching migration means H namely, by carrying out outer fitting of the alignment means L from container axis X Alignment precision with the body A of a container, the convex die 20, and the needlelike die 21 becomes still higher, and improvement in the process tolerance of closed-end conic crevice 6b for taking to press actuation of the body A of a container, and always carrying out dropping administration of the liquid of a constant rate certainly and inlet 6c can be promoted.
[0060] furthermore, when a high-frequency-induction-heating means D to heat a die in the middle of the pinching migration path of said pinching migration means H is established like the above-mentioned With the high-frequency-induction-heating means D established in the middle of the migration path, carrying out pinching migration of the body A of a container continuously with said pinching migration means H Since a die can be quickly overheated even to even whenever [setting-out stoving temperature], the improvement of the yield can be aimed at further, promoting improvement in manufacture efficiency and process tolerance.

[Translation done.]

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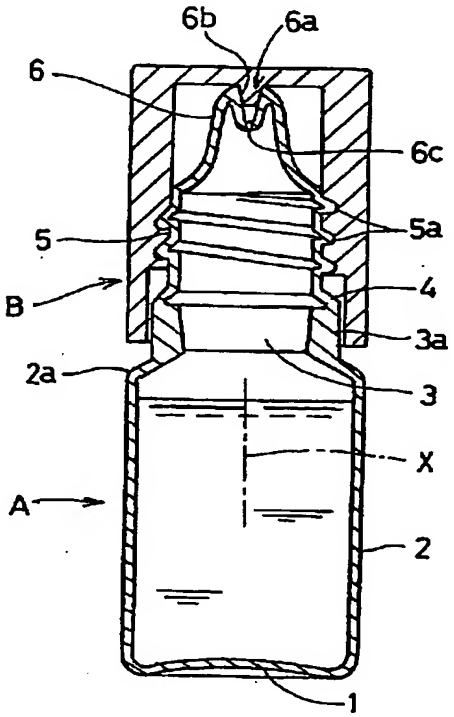
(54)【発明の名称】開口点眼容器及びそれの製造方法

(57)【要約】
【課題】　ボトルパック型の容器本体の持つ利点である製造コスト面での優位性を損なうことなく、容器本体の押圧操作に連れて常に一定量の液体を確実に滴下投与することができる開口点眼容器を提供する。
【解決手段】　成形と同時に液体が密封状態で充填されている熱可塑性材料製の容器本体Ａの先端部に、先端側ほど内径が大となる有底円錐状の凹部６ｂを窪み形成し、この凹部６ｂの底面に、容器本体Ａから押出される液滴量を設定量に制御するための小径の注液孔６ｃを貫通形成してある。



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【特許請求の範囲】

【請求項１】　成形と同時に液体が密封状態で充填されている熱可塑性材料製の容器本体の先端部に、先端側ほど内径が大となる有底円錐状の凹部を窪み形成し、この凹部の底面に、容器本体から押出される液滴量を設定量に制御するための小径の注液孔を貫通形成してある開口点眼容器。

【請求項２】　成形と同時に液体が密封状態で充填されている熱可塑性材料製の容器本体の先端部に、先端側ほど内径が大となる有底円錐状の凹部を窪み形成し、その際この窪みは、この凹部の底面に容器本体から押出される液滴量を設定量に制御するための小径の注液孔を前記凹部の底面に貫通形成可能となる形状を備えている開口点眼容器。

【請求項３】　前記容器本体には、該容器本体の凹部を密封する状態でキャップを脱着自在に螺合装着するためのネジ部が一体形成されている請求項１又は２記載の開口点眼容器。

【請求項４】　前記凹部の深さが２～７ｍｍの範囲に構成されている請求項１、２又は３記載の開口点眼容器。

【請求項５】　前記凹部の先端側の口元径が２～４ｍｍの範囲に構成されている請求項１、２、３又は４記載の開口点眼容器。

【請求項６】　請求項１、３、４又は５記載の開口点眼容器の製造方法であって、成形と同時に液体が密封状態で充填されている容器本体の先端部に、前記凹部を成形する凸状成形型及び前記注液孔を形成する針状成形型を容器軸線方向から圧接して成形する開口点眼容器の製造方法。

【請求項７】　請求項２記載の開口点眼容器の製造方法であって、成形と同時に液体が密封状態で充填されている容器本体の先端部に、前記凹部を成形する凸状成形型を容器軸線方向から圧接して成形する開口点眼容器の製造方法。

【請求項８】　少なくとも前記凸状成形型で成形される部位を、成形前に加熱手段で座屈しない温度に加熱する請求項６又は７記載の開口点眼容器の製造方法。

【請求項９】　前記凸状成形型と針状成形型とが一体形成されている単一の成形型を用いて、容器の先端部に凹部と注液孔とを成形する請求項６記載の開口点眼容器の製造方法。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、医療用点眼液に用いる開口点眼容器及びそれの製造方法の改良に関する。

【０００２】

【従来の技術】医療用点眼液においては点眼量を一定量に制御する必要がある。この点眼量を制御できる一般的な開口点眼容器としては、成形された容器本体の筒状口部に、射出成形品の中栓部材を内嵌固定し、この中栓部

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材には、先端側ほど内径が大となる有底円錐状の凹部と、該凹部の底面中心位置で内外に貫通して、容器本体から押出される液滴量を制御する小径の注液孔とを形成するとともに、前記容器本体の筒状口部の外周面に形成された雄ネジ部に、中栓部材の有底円錐状凹部を嵌合状態で密封するための栓状突起を備えた射出成形品のキャップを螺合装着したものが汎用されている。

【０００３】この開口点眼容器による場合は、中栓部材に形成された有底円錐状の凹部及び該凹部の底面中心位置に貫通形成された小径の注液孔との存在により、容器本体の押圧操作に連れて常に一定量の液体を確実に滴下投与することができるものの、３つの部材をそれぞれ各別に射出成形するための金型が必要で、また各部材の洗浄・滅菌作業が必要となり、製造コストが高くなる。

【０００４】一方、製造コストを下げ，且つ、開口点眼容器としての機能を保持させ得る容器として一体成形容器が使用されている。この容器においては、ブロー成形又は真空成形と同時に液体が充填・封入されている熱可塑性材料製の容器本体（通称、ボトルパック型の容器本体）のうち、先端部側の外周面に形成した雄ネジ部に、容器本体の先端部に注液孔を貫通形成するための針状突起を一体形成してあるキャップを脱着自在に螺合して、該キャップの通常の閉止位置よりも一段深い締込み側への螺合操作により、キャップの針状突起で容器本体の先端部に注液孔を貫通形成するように構成していた。

【０００５】

【発明が解決しようとする課題】上述のボトルパック型の開口点眼容器では、射出成形された中栓部材を用いる開口点眼容器に比して製造コストの低廉化を図ることができる利点を有するものの、容器本体の先端部をキャップの針状突起で突き破りながら注液孔を形成するため、キャップの通常閉止位置からの締込み側への螺合操作量が適切に行われないと、注液孔の形状や大きさが不均一となり、容器本体から押出される液滴量の変動を招来する可能性がある。

【０００６】また、容器本体の先端部に注液孔が貫通形成された後において、キャップを通常閉止位置よりも締込み側に過剰操作すると、その過剰な締込み操作の度に、キャップの針状突起で注液孔を拡張することになり、容器本体から押出される液滴量が次第に増大する可能性がある。

【０００７】そのため、開口点眼容器の使用方法についての十分な説明が必要となるが、例え、十分な説明を施しても、キャップを締込み側へ適当に螺合操作して穿孔したり、或いは、キャップを過剰に締込み操作することがあるため、前述のような誤った使用を確実に回避することは困難であった。

【０００８】本発明は、上述の実状に鑑みて為されたものであって、その第１の主たる課題は、ボトルパック型の容器本体の持つ利点である製造コスト面での優位性を

損なうことなく、容器本体の押圧操作に連れて常に一定量の液体を確実に滴下投与することができる開口点眼容器を提供する点にあり、第２の主たる課題は、製造コストの低廉化を促進することのできる製造方法を提供する点にある。

【０００９】

【課題を解決するための手段】本発明の請求項１による開口点眼容器の特徴構成は、成形と同時に液体が密封状態で充填されている熱可塑性材料製の容器本体の先端部に、先端側ほど内径が大となる有底円錐状の凹部を窪み形成し、この凹部の底面に、容器本体から押出される液滴量を設定量に制御するための小径の注液孔を貫通形成した点にある。上記特徴構成によれば、ブロー成形や真空成形等による成形と同時に液体が密封状態で充填されている熱可塑性材料製の容器本体（ボトルパック型の容器本体）を利用して、この容器本体の先端部に、先端側ほど内径が大となる有底円錐状の凹部と、容器本体から押出される液滴量を設定量に制御するための小径の注液孔とを直接形成するが故に、射出成形された中栓部材を用いる開口点眼容器に比して容器本体を製造するための金型が少なくて済むとともに、有底円錐状の凹部と小径の注液孔との存在により、容器本体の押圧操作に連れて常に一定量の液体を確実に滴下投与することができる。従って、ボトルパック型の容器本体の先端部に中栓機能を発揮させるための有底円錐状の凹部と小径の注液孔とを形成するだけであるから、ボトルパック型の容器本体の持つ利点である製造コスト面での優位性を損なうことなく、常に一定量の液体を確実に滴下投与することができる。本発明による開口点眼容器で特に重要な点は、液滴量を設定量に制御するための小径の注液孔を貫通形成することができる形状をもった凹部を、成形と同時に液体が密封状態で充填されている熱可塑性材料製の容器本体の先端部に形成することである。このことから、本発明の枠内には、そうような凹部が形成された半完成品としての開口点眼容器もはいるものであり、そのような開口点眼容器の構成は、請求項２に記載するように、成形と同時に液体が密封状態で充填されている熱可塑性材料製の容器本体の先端部に、先端側ほど内径が大となる有底円錐状の凹部を窪み形成し、その際この窪みは、この凹部の底面に容器本体から押出される液滴量を設定量に制御するための小径の注液孔を前記凹部の底面に貫通形成可能となる形状を備えているという特徴を備えている。

【００１０】本発明の請求項３による開口点眼容器の特徴構成は、前記容器本体に、該容器本体の凹部を密封するキャップを脱着自在に螺合装着するためのネジ部が一体形成されている点にある。上記特徴構成によれば、容器本体の成形と同時に、キャップを螺合装着するためのネジ部も形成することができるから、製造コストの低廉化を促進することができる。

【００１１】本発明の請求項４による開口点眼容器の特徴構成は、前記凹部の深さが２～７ｍｍの範囲に構成されている点にある。上記特徴構成によれば、前記凹部の深さはできるだけ深い方が望ましいが、歩留まりや安定した中栓機能を得る等の技術面から、５～７ｍｍの範囲にあることが望ましいが、最も好ましくは６ｍｍ程度である。この凹部深さが適切な値より小さくなると、凹部の周囲に形成される容器内の環状の空間（液溜まり）に表面張力によって溜まる液によってその凹部の先端部、つまり注液孔が覆われ、容器を手で持った際に生じる圧力でその液溜まりの液が注液孔を通じて飛び出すといった問題が生じる。また、この凹部深さが適切な値より大きくなると、この凹部を形成する工程時に、凹部に亀裂がはいるといった不良が生じやすくなる。このような相反する条件を満たす最適解が６ｍｍである。しかし、表面張力が小さい薬液の場合には液溜まりの量を少なく、凹部の深さはそれほど必要ではないので、凹部の深さを浅く設計することもできる。

【００１２】本発明の請求項５による開口点眼容器の特徴構成は、前記凹部の先端側の口元径が２～４ｍｍの範囲に構成されている点にある。上記特徴構成によれば、容器本体に充填される液体の液性（表面張力、粘度）に合わせてφ２．０ｍｍ～φ４．０ｍｍの範囲内で調整する。１滴量を一定化（目的に合わせて１滴量当たり２５～５０ミクロンリットルの範囲内に調整）するため、表面張力が大きい液性の場合は、前記口元径を小さくし、表面張力が小さい液性の場合は、前記口元径を大きくする。

【００１３】本発明の請求項６による開口点眼容器の製造方法の特徴構成は、成形と同時に液体が密封状態で充填されている容器本体の先端部に、前記凹部を成形する凸状成形型及び前記注液孔を形成する針状成形型を容器軸線方向から圧接して成形する点にある。上記特徴構成によれば、ブロー成形や真空成形等による成形と同時に液体が密封状態で充填されている熱可塑性材料製の容器本体（ボトルパック型の容器本体）を利用して、この容器本体の先端部に、先端側ほど内径が大となる有底円錐状の凹部と、容器本体から押出される液滴量を設定量に制御するための小径の注液孔とを直接形成するが故に、射出成形された中栓部材を用いる開口点眼容器に比して容器本体を製造するための金型が少なくて済むとともに、有底円錐状の凹部と小径の注液孔との存在により、容器本体の押圧操作に連れて常に一定量の液体を確実に滴下投与することができる。しかも、前記凹部を成形する凸状成形型及び前記注液孔を形成する針状成形型を容器軸線方向から圧接するだけであるから、多数の容器本体を移送しながら有底円錐状の凹部と小径の注液孔とを形成することも可能である。従って、ボトルパック型の容器本体の先端部に、中栓機能を発揮させるための有底円錐状の凹部と小径の注液孔とを形成するだけであり、

しかも、多数の容器本体を移送しながら加工することが可能であるから、常に一定量の液体を確実に滴下投与することのできる開口点眼容器を製造コスト面で有利に製造することができる。また、上述した、本発明による凹部が形成されている半完成品としての開口点眼容器のための製造方法は、請求項７で示すように、成形と同時に液体が密封状態で充填されている容器本体の先端部に、前記凹部を成形する凸状成形型を容器軸線方向から圧接して成形することで特徴付けられ、前述の作用効果を有する。

【００１４】本発明の請求項８による開口点眼容器の製造方法の特徴構成は、少なくとも前記凸状成形型で成形される部位を、成形前に加熱手段で座屈しない温度に加熱する点にある。上記特徴構成によれば、前記容器本体の先端部に形成される凹部の加工精度の向上と歩留まりの改善とを図ることがてきる。

【００１５】本発明の請求項９による開口点眼容器の製造方法の特徴構成は、前記凸状成形型と針状成形型とが一体形成されている単一の成形型を用いて、容器の先端部に凹部と注液孔とを成形する点にある。上記特徴構成によれば、単一の成形型で有底円錐状の凹部と小径の注液孔とを形成することができるから、製造能率の向上と製造設備の簡素化を図ることができる。

【００１６】

【発明の実施の形態】〔第１実施形態〕図１は、主として医療用に用いられる本発明の開口点眼容器を示し、ブロー成形又は真空成形と同時に所定量の薬液が充填された可撓性のある熱可塑性材料製の容器本体Ａと、該容器本体Ａのネジ筒部５の外周面に形成された雄ネジ部５ａに着脱自在に螺合されるキャップＢとから構成されている。

【００１７】前記容器本体Ａは、内側に彎曲する円形状の底部１と、これの周縁に連なる中空円筒状の胴部２と、該胴部２の肩部分２ａに連続する円筒状の首部３と、該首部３の上側位置から直径方向外方に膨出する円環状段部４と、これの上側に連続する雄ネジ部５ａを備えたネジ筒部５と、これの上側に連続する注液口６ａを備えた注液筒部６とから構成されているとともに、前記首部３の円周方向二個所で、かつ、容器軸線Ｘを挟んで相対向する部位の各々には、容器軸線Ｘ方向に沿う板状のリブ３ａが一体形成されている。

【００１８】前記容器本体Ａの注液筒部６には、注液口６ａ側ほど内径が大となる有底円錐状の凹部６ｂが窪み形成され、この凹部６ｂの底面には、前記胴部２の指先による押圧操作に連れて容器本体Ａから押出される液滴量を設定量に制御可能な小径の注液孔６ｃが形成されている。

【００１９】前記凹部６ｂの深さは２～７ｍｍの範囲、好ましくは、５～７ｍｍの範囲、最も好ましくは６ｍｍに構成するとともに、前記注液口６ａの口径（口元径）は、薬液の液性（表面張力、粘度）に合わせてφ２．０ｍｍ～φ４．０ｍｍの範囲で調整する。１滴量を一定化（目的に合わせて１滴量当たり２５～５０ミクロンリットルの範囲内に調整）するため、表面張力が大きい液性の場合は、前記注液口６ａの口径を小さくし、表面張力が小さい液性の場合は、前記注液口６ａの口径を大きくする。

【００２０】更に、前記注液孔６ｃは、φ０．１ｍｍ～φ０．８ｍｍの範囲の径の針を用いて形成する。この針の径は、小さい方が好ましく、φ０．２ｍｍ程度が最も好ましいが、あまり小さいと技術的に困難となるので、実際には、φ０．４ｍｍ～φ０．６ｍｍの範囲の針を用いる。

【００２１】前記容器本体Ａの構成材料である熱可塑性材料としては、ポリエチレン、ポリエチレン－ポリプロピレン、ポリプロピレン、ポリエチエチレンテレフタレート、ポリカーボネート等があり、また、前記キャップＢには、容器本体Ａの雄ネジ部５ａに螺合したとき、該容器本体Ａの凹部６ｂに内嵌して密封する栓状突起８が一体形成されている。

【００２２】前記凹部６ｂ及び注液孔６ｃが形成される前の容器本体Ａの製造方法については、当該技術分野において周知であるので、簡単に説明する。図２（イ）に示すように、前記容器本体Ａの円環状段部４から底部１までの範囲の部分を成形するための第１キヤビティ１０を備えた一対の主成形金型１１と、容器本体Ａのネジ筒部５及び注液筒部６を成形するための第２キヤビティ１２を備えた一対の副成形金型１３とを開き作動させた状態で、それらの上部に配置した押出し機ヘッド１４から、両金型１１，１３間を通して垂直方向に沿って細長く中空チューブ状の半溶融熱可塑性材料である所定長さのパリソン１５を押出す。

【００２３】次に、図２（ロ）に示すように、前記主成形金型１１を閉じ作動させるとともに、圧縮空気の吹き込み作用又は真空作用によって、主成形金型１１の成形面１１ａに沿ってパリソン１５を膨張させながら成形する。この状態で、図２（ハ）に示すように、薬剤供給管１６から所定量の液体（薬液）を充填する。この液体充填工程が終了すると、図２（二）に示すように、前記副成形金型１３を閉じ作動させるとともに、圧縮空気の吹き込み作用又は真空作用によって、副成形金型１３の成形面１３ａに沿ってパリソン１５を膨張させながら成形し、成形と同時に充填された液体を密封（封入）する。

【００２４】次に、上述の如くブロー成形又は真空成形された容器本体Ａの先端部である注液筒部６に有底円錐状の凹部６ｂ及び小径の注液孔６ｃを形成する三方式の製造方法についてそれぞれ説明する。［第１方式の製造方法］図３（イ）～（ニ）に示す第１方式の製造方法では、前記有底円錐状の凹部６ｂを成形する金属製の凸状成形型２０と、前記注液孔６ｃを形成する金属製の針状

成形型２１とを用いる。前記凸状成形型２０は、取付け軸２０Ａの先端部に、有底円錐状の凹部６ｂを成形する円錐状成形突起２０Ｂと、容器本体Ａの注液筒部６の外周面を成形する椀状（釣り鐘状）の成形面２０Ｃとを形成して構成されており、また、前記針状成形型２１は、取付け軸２１Ａの先端部に、小径の注液孔６ｃ形成する針状成形突起２１Ｂを形成して構成されている。

【００２５】そして、この第１方式の製造方法では、図３（イ）に示すように、容器本体Ａの先端部である注液筒部６の一部を、温風若しくはハロゲンランプ、レーザー光線等の第１加熱手段Ｃで室温又は７０℃～１５０℃に加熱する。加熱温度は、容器本体Ａの材質、形状にもよるが、容器本体Ａの先端が少し軟化する温度が望ましい。容器本体Ａの熱可塑性材料が、ポリエチレンのように柔らかい樹脂材料である場合では、加熱しないと先端部が座屈するので、少なくとも前記凸状成形型２０で成形される部位を、成形前に第１加熱手段Ｃで座屈しない温度に加熱する必要がある。しかし、座屈に耐え得る樹脂材料や形状の場合、即ち、凸状成形型２０の容器軸線Ｘ方向からの押圧に耐え得る場合では、室温でも成形が可能である。

【００２６】次に、図３（ロ）に示すように第１加熱手段Ｃで加熱された容器本体Ａの注液筒部６の一部が冷えないうちに、前記凸状成形型２０を容器軸線Ｘ方向から押し当て、容器本体Ａの注液筒部６に、注液口６ａ側ほど内径が大となる有底円錐状の凹部６ｂを成形する。このとき、前記凸状成形型２０の椀状成形面２０Ｃにより、容器本体Ａの注液筒部６の外周面に突出しているブロー成形時のバリを除去することができる。

【００２７】前記凸状成形型２０自体は、成形される容器本体Ａの注液筒部６の形状と肉厚に合わせ、室温から１５０℃の範囲で温度制御する。加熱温度として注液筒部６の先端の冷却固化を考慮し、できるだけ低い温度が望ましい。この凸状成形型２０は、充填される液体の液性に合わせて簡単に交換できるようにする。

【００２８】次に、図３（ハ）、（ニ）に示すように、前記容器本体Ａの注液筒部６に形成された凹部６ｂの底面中央位置に対して、針状成形型２１を容器軸線Ｘ方向から押し当て、胴部２の指先による押圧操作に連れて容器本体Ａから押出される液滴量を設定量に制御可能な小径の注液孔６ｃを形成する。この針状成形型２１の針状突起２１Ｂによる注液孔６ｃの形成工程において、針状突起２１Ｂを室温のままで作業する方法と、針状突起２１Ｂを加熱してから作業する方法が提案される。採用すべき方法は、形成する注液孔６ｃの形状や凹部６ｂの形状、されには容器のその他の形状や材質、製造コストなどの条件に応じて選択される。加熱を要する場合の加熱温度としては、針状成形型２１の少なくとも針状突起２１Ｂを、容器材質の樹脂が溶融する温度、１３０℃～１８０℃の範囲が好適である。

【００２９】針状成形型２１の加熱は、高周波誘導加熱、ハロゲンランプ、温風等の第２加熱手段Ｄにより行い、針状成形型２１の付根である取付け軸２１Ａは、ウォータージャケット、圧縮空気等の冷却手段Ｅで冷却するように構成する。そして、前記針状成形型２１が所定温度にまで冷却された時点で、該針状成形型２１を所定形状に成形された容器本体Ａの注液筒部６から容器軸線Ｘ方向に沿って抜き取る。

【００３０】前記針状成形型２１は、樹脂の剥離性、離型性を良くするため、表面にメッキ若しくはテフロン（登録商標）コーティング、特殊メッキの表面処理を施しても良い。この表面処理は、高温に耐えられ、かつ、簡単に剥離しないものが望ましい。

【００３１】［第２方式の製造方法］図４（イ）～（ニ）に示す第２方式の製造方法では、第１方式と同様に、前記有底円錐状の凹部６ｂを成形する金属製の凸状成形型２０と前記注液孔６ｃを形成する金属製の針状成形型２１とを用いる。前記凸状成形型２０は、取付け軸２０Ａの先端部に、有底円錐状の凹部６ｂを成形する円錐状成形突起２０Ｂのみを形成して構成されており、また、前記針状成形型２１は、取付け軸２１Ａの先端部に、小径の注液孔６ｃを形成する針状成形突起２１Ｂと、容器本体Ａの注液筒部６の外周面を成形する椀状（釣り鐘状）の成形面２１Ｃとを形成して構成され、更に、前記針状成形突起２１Ｂの付け根部分２１ｂは、前記円錐状成形突起２０Ｂにて形成された凹部６ｂに沿う円錐形状に形成されている。

【００３２】第１方式では、図３（ロ）に示すように、凸状成形型２０による成形時に、容器本体Ａの注液筒部６の外周面に突出しているブロー成形時のバリを除去するように構成したが、この第２方式では、図４（ハ）に示すように、針状成形型２１による成形時に、容器本体Ａの注液筒部６の外周面に突出しているブロー成形時のバリを除去するように構成したものであり、それ以外の構成は、第１方式と同一である。

【００３３】［第３方式の製造方法］図５（イ）～（ニ）に示す第３方式の製造方法では、前記有底円錐状の凹部６ｂを成形する凸状成形型と前記注液孔６ｃを形成する針状成形型とが一体形成されている金属製の単一の成形型２２を用いる。この単一成形型２２は、取付け軸２２Ａの先端部に、有底円錐状の凹部６ｂを成形する円錐状成形突起２２Ｂと、容器本体Ａの注液筒部６の外周面を成形する椀状（釣り鐘状）の成形面２２Ｄとを形成するとともに、前記円錐状成形突起２２Ｂの先端には、小径の注液孔６ｃを形成する針状成形突起２２Ｃを同芯状態で一体形成して構成されている。

【００３４】この第３方式の製造方法では、図５（イ）、（ロ）に示すように、容器本体Ａの注液筒部６の先端側を加熱せず、成形された温度（７０℃～８０℃）のままでも、室温にまで冷えてからでも良く、小径

の注液孔６ｃを形成する針状成形突起２２Ｃを、容器本体Ａの注液筒部６の先端に対して凹部６ｂを形成する手前まで突き刺す。

【００３５】容器本体Ａの注液筒部６の先端に突き刺された針状成形突起２２Ｃは、図５（ハ）に示すように、第２加熱手段Ｄの一例である高周波誘導加熱手段により加熱される。加熱温度は、容器材料が溶融する温度付近が望ましく、通常１２０℃～２００℃の範囲、好ましくは、１６０℃付近で制御される。針状成形突起２２Ｃ及び円錐状成形突起２２Ｂを備えた単一成形型２２は、図５（ニ）に示すように、加熱されながら２ｍｍから８ｍｍ押し込まれ、容器本体Ａの注液筒部６の先端側を容器軸線Ｘ方向から圧縮するように加圧しながら有底円錐状の凹部６ｂを成形する。

【００３６】この単一成形型２２の円錐状成形突起２２Ｂの押し込みは深い方が好ましいが、技術的問題から５～７ｍｍの範囲とする。この時、溶融した容器本体Ａの注液筒部６の先端部に気泡が入らないように、単一成形型２２にガス抜き穴を設けても良い（先端部の樹脂を完全に溶融するので、ガス抜きが必要）。

【００３７】単一成形型２２の付根である取付け軸２２Ａは、図１１（イ）に示すように、ウォータージャケット、圧縮空気等の冷却手段Ｅで冷却するように構成する。そして、前記単一成形型２２が所定温度にまで冷却された時点で、該単一成形型２２を所定形状に成形された容器本体Ａの注液筒部６から容器軸線Ｘ方向に沿って抜き取る。

【００３８】前記単一成形型２２は、樹脂の剥離性、離型性を良くするため、表面にメッキ若しくはテフロンコーティング、特殊メッキの表面処理を施しても良い。この表面処理は、２８０℃以上に耐え得ることができ、かつ、簡単に剥離しないものが望ましい。そして、第１方式から第３方式の何れかの製造方法で成形された容器本体Ａの先端部側の有底円錐状の凹部６ｂ及び小径の注液孔６ｃは、中栓としての機能を有する。安定した１滴量、一滴の液滴内に気泡がかみ込むことの防止、また気泡の切れを良くすることが挙げられる。また、上述した第２方式と第３方式においても、針状突起２１Ｂ又は２２Ｃよる注液孔６ｃの形成工程において、針状突起２１Ｂ又は２２Ｃを第２加熱手段Ｄによって加熱してから作業していたが、前述したように、場合によってはそのような加熱を行わず、室温状態の針状突起２１Ｂ又は２２Ｃを用いて注液孔６ｃの形成することも可能である。

【００３９】次に、前記第１方式から第３方式の製造方法に用いられる製造機について説明する。図６～図１１に示すように、ブロー成形又は真空成形された多数の容器本体Ａを一直線状の供給経路に沿って載置搬送する搬送供給手段Ｆと、該搬送供給手段Ｆにて載置搬送されてきた容器本体Ａを先頭のものから円弧状の送込み経路に沿って搬送する容器送込み手段Ｇと、この容器送込み手段Ｇから送込まれてきた容器本体Ａの肩部又はその近くを挟持して、該容器本体Ａの水平方向及び少なくとも下方への移動を阻止した状態で円弧状の挟持移送経路に沿って移送する挟持移送手段Ｈと、該挟持移送手段Ｈの円弧状挟持移送経路に沿って移送されてくる加工後の容器本体Ａを受け取って円弧状の送出し経路に沿って移送する容器送出し手段Ｊとが設けられている。

【００４０】また、前記容器送込み手段Ｇには、容器本体Ａの先端部である注液筒部６の一部を加熱する第１加熱手段Ｃが配設されているとともに、前記挟持移送手段Ｈには、該挟持移送手段Ｈで挟持移送される容器本体Ａの先端部に対して、選択的に付替え自在に装着される凸状成形型２０又は針状成形型２１若しくは単一成形型２２を待機位置と成形加工位置とに切替え作動させる切替手段Ｋと、前記挟持移送手段Ｈの一対の挟持爪で挟持移送される容器本体Ａのうち、一対の挟持爪から突出する先端側の部位に対して容器軸線Ｘ方向から外嵌する状態と離脱させた待機状態とに切替えられる芯出し手段Ｌとが配設され、更に、前記挟持移送手段Ｈの円弧状挟持移送経路の途中には、成形型である針状成形型２１又は単一成形型２２を加熱する第２加熱手段の一例である高周波誘導加熱手段Ｄが設けられている。

【００４１】前記搬送供給手段Ｆは、図６に示すように、機枠２４に取付られた搬送フレーム２５の長手方向両端部に、電動モータ２６に連動された横軸芯周りで回転自在な駆動スプロケット　（図示せず）と、横軸芯周りで回転自在な従動スプロケット（図示せず）とを設け、前記両スプロケットに亘って、多数の容器本体Ａを載置搬送する無端搬送体２９を巻回するとともに、無端搬送体２９上の容器本体Ａを搬送案内する左右一対の搬送ガイド板３０を設けて構成されている。

【００４２】前記容器送込み手段Ｇは、図６、図７に示すように、電動モータ３３に連動して縦軸芯周りで駆動回転される駆動回転板３４の外周縁部に、前記搬送供給手段Ｆから送出されてくる先頭の容器本体Ａが入り込み保持される複数の凹状の保持部３５を円周方向に沿って一定ピッチで形成するとともに、前記各保持部３５内に保持された容器本体Ａの底部を受け止めて移送案内する載置ガイド板３６と、前記各保持部３５内に保持された容器本体Ａの回転半径方向外方への抜け出し移動を阻止する移送ガイド３７とを設けて構成されている。

【００４３】前記第１加熱手段Ｃは、前述した第１方式及び第二方式の製造時にのみ使用されるものであって、次のように構成されている。即ち、図６、図７に示すように、前記容器送込み手段Ｇの駆動回転板３４のうち、各保持部３５に対応する部位（当該図面では簡略化して一箇所だけ記載してある）の各々に、該駆動回転板３４に貫通形成された一対の貫通孔３４ａに沿って上下方向に摺動する一対の昇降ガイド軸４０ａ，４０ｂを備えた昇降枠４０を、圧縮コイルスプリング４１にて下降側に

移動付勢した状態で設けるとともに、前記各昇降枠４０の上部には、保持部３５に保持された容器本体Ａの注液筒部６の根元側部分に対して容器軸線Ｘ方向から脱着自在に外嵌可能な遮熱板４２を取付けてある。

【００４４】また、前記各昇降枠４０の下部に設けたローラ４３の回動移動軌跡に対応位置する機枠２４側の支持部材４４には、搬送供給手段Ｆの容器供給位置から挟持移送手段Ｈへの容器受渡位置に送込み搬送されるとき、前記遮熱板４２を容器本体Ａの注液筒部６の根元側部分に外嵌させた遮熱作用姿勢に下降させ、かつ、容器受渡位置から容器供給位置に戻し搬送されるとき、前記圧縮コイルスプリング４１の弾性復元力に抗して遮熱板４２を上方に離間した待機姿勢に上昇させるカム部材４５を高さ調節自在に取付けてある。

【００４５】更に、前記容器送込み手段Ｇの駆動回転板３４のうち、各保持部３５に対応する部位の各々には、各保持部３５に保持された容器本体Ａの先端部である注液筒部６の頂部に対して、２００℃～５００℃の熱風を供給する熱風供給管４６を設けてある。

【００４６】前記挟持移送手段Ｈは、図６、図８、図１０に示すように、電動モータ５０に連動して縦軸芯周りで駆動回転される駆動回転板５１の外周縁部で、かつ、その回転方向に所定間隔を隔てた複数箇所（当該図面では簡略化して一箇所だけ記載してある）の各々に、駆動回転板５１の回転軸芯と平行な縦軸芯周りで回動自在な一対の作動軸４２を支承し、両作動軸４２の上端部には、容器本体Ａの環状溝部となる首部３に対して水平方向から嵌合状態で挟持するための半円弧状の挟持面５３ａを備えた一対の挟持爪４３を取付けるとともに、前記両作動軸４２には、互いに噛合連動するギヤ５４を外嵌固定し、更に、一方の作動軸４２の下端部に固着した作動アーム５５と駆動回転板５１側との間に、前記一対の挟持爪４３を開閉作動させる流体シリンダ５６を架設してある。

【００４７】また、前記両挟持爪４３に挟持移送される容器本体Ａの底部１を載置状態で摺動案内する載置摺動ガイド板５７と、前記両挟持爪４３に挟持移送される容器本体Ａの回転半径方向外方への抜け出し移動を阻止する移送ガイド部材５８とを設けてある。

【００４８】そして、前記一対の挟持爪４３で容器本体Ａの首部３を挟持した状態では、該容器本体Ａの水平方向及び少なくとも下方への移動を阻止した状態にあるから、容器本体Ａと前記切替手段Ｋに付替え自在に装着される凸状成形型２０又は針状成形型２１若しくは単一成形型２２との芯合わせ精度が高くなるとともに、成形型の押圧に伴う容器本体Ａの容器軸線Ｘ方向での弾性変形に起因する有底円錐状の凹部６ｂ及び小径の注液孔６ｃの加工精度の低下を抑制することができる。

【００４９】前記切替手段Ｋは、図８、図９に示すように、駆動回転板５１のうち、各両挟持爪４３に対応する複数箇所（当該図面では簡略化して一箇所だけ記載してある）の各々に、回転半径方向及び上下方向に往復移動される可動枠６０を配置し、この可動枠６０の先端側取付け部６０Ａの回転半径方向の二個所には、下方に向かって開口する軸装着口を備えた二本のホルダ筒軸６２を、ナット６３を介して脱着自在に取付けるとともに、前記各ホルダ筒軸６２の軸装着口には、凸状成形型２０の取付け軸２０Ａ又は針状成形型２１の取付け軸２１Ａ若しくは単一成形型２２の取付け軸２２Ａを選択的に付け替え自在に保持するナット６１を螺合装着してある。また、前記可動枠６０の二本の水平スライド軸６０Ｂを摺動自在に保持する昇降ブロック６４には、駆動回転板５１に対して昇降自在に摺動する二本の長さの異なる垂直スライド軸６５，６６を下方に延出し、そのうち、長尺の垂直スライド軸６５の下端部を、機枠２４に設けられた一対の昇降ガイド軸６８に沿って摺動自在な昇降連結体６７に連結するとともに、前記昇降連結体６７の幅方向中央位置に上下方向から螺合されたネジ軸７０を、機枠２４に固定された電動モータ６９に連動し、更に、前記昇降ブロック６４に対して可動枠６０を回転半径方向にスライド移動させる流体圧シリンダ７１を、前記駆動回転板５１に取付けてある。

【００５０】前記両ホルダ筒軸６２のうち、回転半径方向内方に位置する短尺側の第１ホルダ筒軸６２の軸芯は、一対の挟持爪４３で挟持された容器本体Ａの軸線Ｘと合致するように構成されていて、回転半径方向内方に位置する長尺側の第２ホルダ筒軸６２に選択的に装着された凸状成形型２０又は針状成形型２１若しくは単一成形型２２を成形作動させる場合には、前記流体圧シリンダ７１を作動制御して、第２ホルダ筒軸６２の軸芯が、一対の挟持爪４３で挟持された容器本体Ａの軸線Ｘと合致する位置までスライドさせる。

【００５１】また、前記両ホルダ筒軸６２に選択的に装着された凸状成形型２０又は針状成形型２１若しくは単一成形型２２を成形作動させる場合には、前記電動モータ６９を駆動制御して可動枠６０を所定量だけ下降させ、成形型を待機位置から成形加工位置に切替え作動させる。

【００５２】前記芯出し手段Ｌは、図８、図１１に示すように、前記垂直スライド軸６５，６６に沿ってスライド移動自在に外装された可動筒状体７５の上部に、一対の挟持爪４３で挟持された容器本体Ａのネジ筒部５に対して容器軸線Ｘ方向から外嵌する嵌合孔７６ａを形成してある芯出環状体７６を取付けるとともに、前記可動筒状体７５と機枠２４側との間には、前記芯出環状体７６を容器本体Ａのネジ筒部５に嵌合する芯出し位置と上方に離間させた待機位置とに切替え作動させる流体圧シリンダ７７を取付けてある。

【００５３】前記両ホルダ筒軸６２の各々には、図１１（イ）に示すように、冷却手段Ｅを構成するウォーター

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ジャケット８０が形成されているとともに、前記ウォータージャケット８０に冷却水を供給する給水接続管８１と、ウォータージャケット８０内の冷却水を排出する排水接続管８２とが設けられている。

【００５４】そして、前述の如く、成形と同時に液体が密封状態で充填されている容器本体Ａの肩部又はその近くを挟持して、該容器本体Ａの水平方向及び少なくとも下方への移動を阻止した状態で経路に沿って移送する挟持移送手段Ｈと、該挟持移送手段Ｈで挟持移送される容器本体Ａの先端部に対して、前記凹部６ｂを成形する凸状成形型２０及び前記注液孔６ｃを形成する針状成形型２１を待機位置と成形加工位置とに切替え作動させる切替手段Ｋとを設けた場合には、次の作用・効果を奏する。

【００５５】即ち、ブロー成形や真空成形等による成形と同時に液体が密封状態で充填されている熱可塑性材料製の容器本体Ａ（ボトルパック型の容器本体）を利用して、この容器本体Ａの先端部に、先端側ほど内径が大となる有底円錐状の凹部６ｂと、容器本体Ａから押出される液滴量を設定量に制御するための小径の注液孔６ｃとを直接形成するが故に、射出成形された中栓部材を用いる開口点眼容器に比して容器本体を製造するための金型が少なくて済むとととともに、有底円錐状の凹部６ｂと小径の注液孔６ｃとの存在により、容器本体Ａの押圧操作に連れて常に一定量の液体を確実に滴下投与することができる。

【００５６】しかも、前記挟持移送手段Ｈで挟持移送される容器本体Ａの先端部に対して、凸状成形型２０及び針状成形型２１を待機位置から成形加工位置に切替え作動させて有底円錐状の凹部６ｂ及び小径の注液孔６ｃを形成する際、容器本体Ａの肩部又はその近くを挟持移送手段Ｈで挟持して、該容器本体Ａの水平方向及び少なくとも下方への移動を阻止してあるから、容器本体Ａと凸状成形型２０及び針状成形型２１との芯合わせ精度が高くなるとともに、容器本体Ａの容器軸線Ｘ方向での弾性変形に起因する有底円錐状の凹部６ｂ及び小径の注液孔６ｃの加工精度の低下を抑制することができる。

【００５７】従って、容器本体Ａの押圧操作に連れて常に一定量の液体を確実に滴下投与するための有底円錐状の凹部６ｂ及び注液孔６ｃの加工精度の向上を図りながら、ボトルパック型の容器本体Ａの持つ利点である製造コストの低廉化をより促進することができる。

【００５８】また、前述の如く、前記挟持移送手段Ｈの挟持爪５３で挟持移送される容器本体Ａのうち、挟持爪５３から突出する先端側の部位に対して容器軸線Ｘ方向から外嵌する状態と離脱させた待機状態とに切替えられる芯出し手段Ｌが設けられている場合には、次の作用・効果を奏する。

【００５９】即ち、前記挟持移送手段Ｈの挟持爪５３で

14

挟持された容器本体Ａの先端側の部位に対して、容器軸線Ｘ方向から芯出し手段Ｌを外嵌させることにより、容器本体Ａと凸状成形型２０及び針状成形型２１との芯合わせ精度が更に高くなり、容器本体Ａの押圧操作に連れて常に一定量の液体を確実に滴下投与するための有底円錐状の凹部６ｂ及び注液孔６ｃの加工精度の向上を促進することができる。

【００６０】更に、前述の如く、前記挟持移送手段Ｈの挟持移送経路の途中に、成形型を加熱する高周波誘導加熱手段Ｄが設けられている場合には、前記挟持移送手段Ｈで容器本体Ａを連続的に挟持移送しながら、その移送経路途中に設けた高周波誘導加熱手段Ｄによって、成形型を設定加熱温度にまで急速に過熱することができるから、製造能率及び加工精度の向上を促進しつつ歩留まりの改善をさらに図ることができる。

【図面の簡単な説明】

【図１】本発明の開口点眼容器を示す断面正面図

【図２】（イ）～（ニ）は、容器本体のブロー成形又は真空成形による成形工程図

【図３】（イ）～（ニ）は、第１方式による製造方法を示す工程説明図

【図４】（イ）～（ニ）は、第２方式による製造方法を示す工程説明図

【図５】（イ）～（ニ）は、第３方式による製造方法を示す工程説明図

【図６】開口点眼容器の製造機を示す概略平面図

【図７】容器送込み手段の拡大断面面図

【図８】挟持移送手段、切替手段、芯出手段の拡大断面図

【図９】切替手段の要部の拡大図

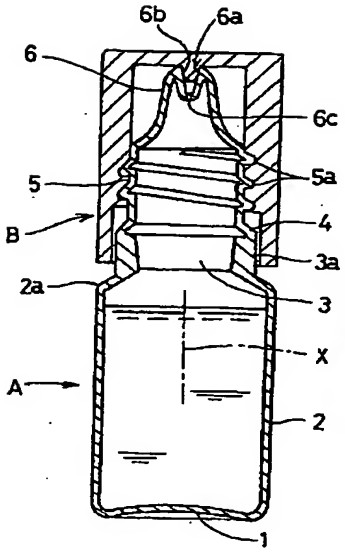
【図１０】挟持爪の駆動系統図

【図１１】（イ）～（ハ）は、第１方式による製造工程を示す要部の拡大断面図

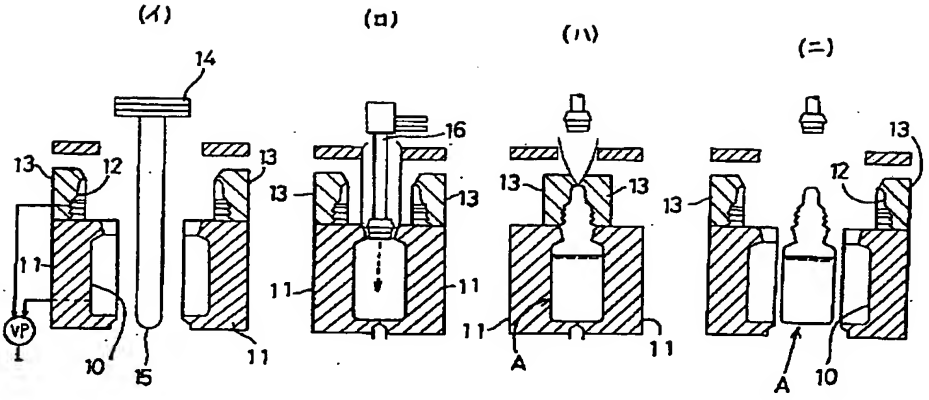
【符号の説明】

Ａ	容器本体
Ｂ	キャップ
Ｄ	第２加熱手段（高周波誘導加熱手段）
Ｈ	挟持移送手段
Ｋ	切替手段
Ｌ	芯出手段
Ｘ	容器軸芯
５ａ	ネジ部（雄ネジ部）
６ｂ	凹部
６ｃ	注液孔
２０	凸状成形型
２１	針状成形型
２２	単一成形型
５３	挟持爪

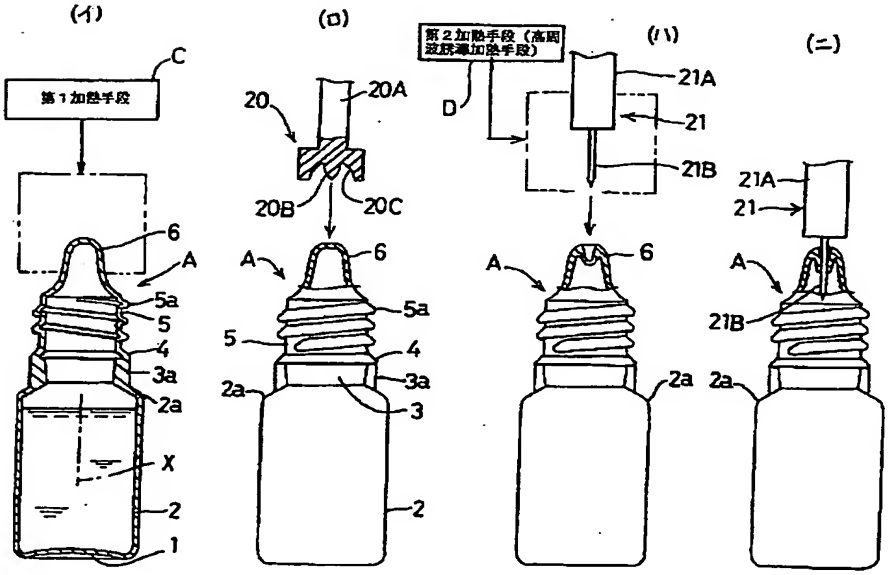
【図１】


6b
6a
6
6c
5
5a
B
4
3a
2a
3
X
A
2
1

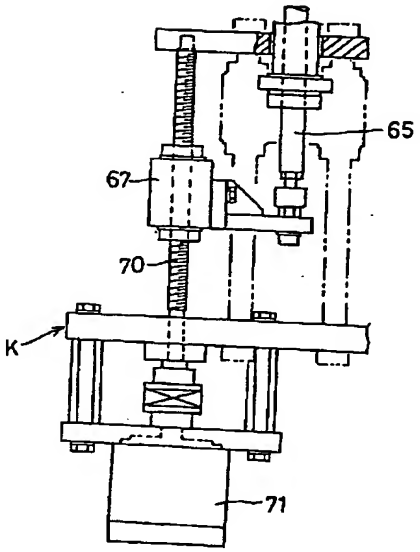
【図２】


(イ)
(ロ)
(ハ)
(ニ)
14
13
12
11
VP
10
15
16
A

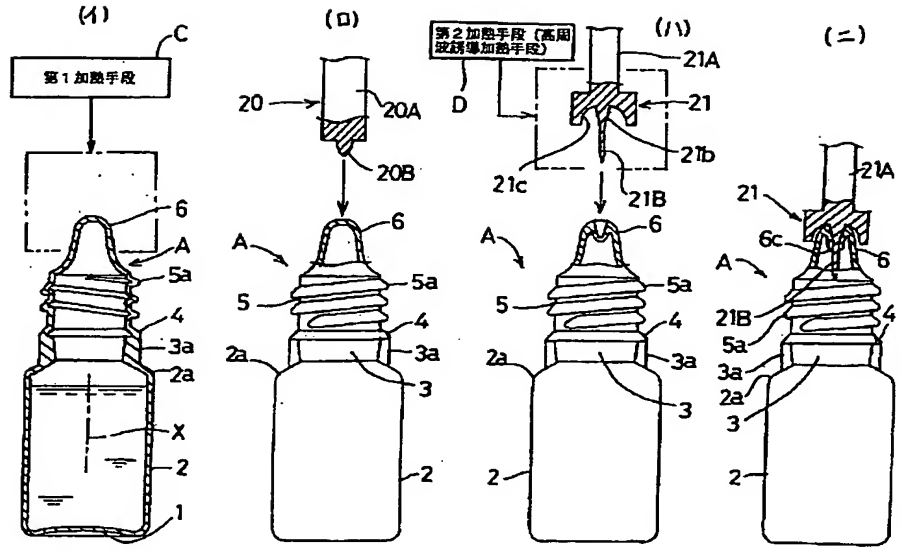
【図３】


(イ)
(ロ)
(ハ)
(ニ)
第１加熱手段
C
第２加熱手段（高周波誘導加熱手段）
D
20
20A
20B
20C
21A
21
21B
6
A
5a
5
4
3a
2a
3
X
2
1

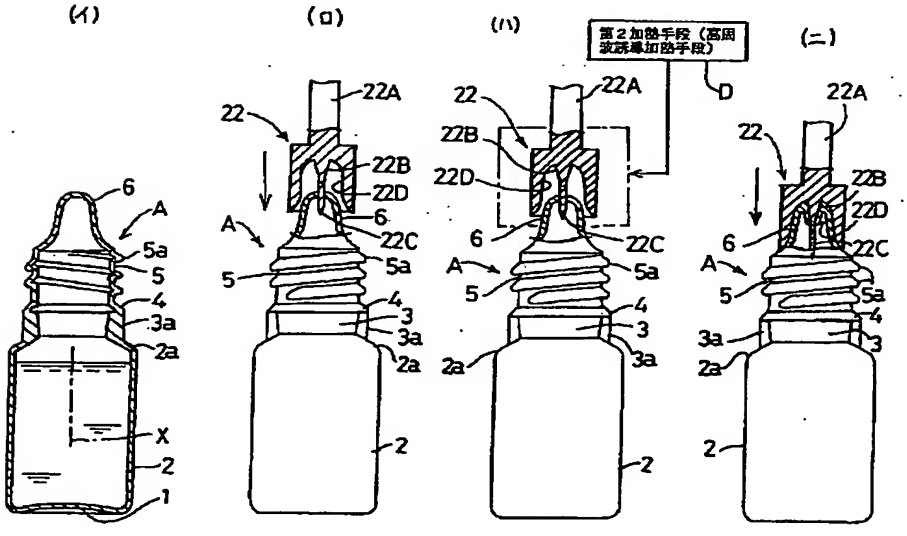
【図９】


65
67
70
K
71

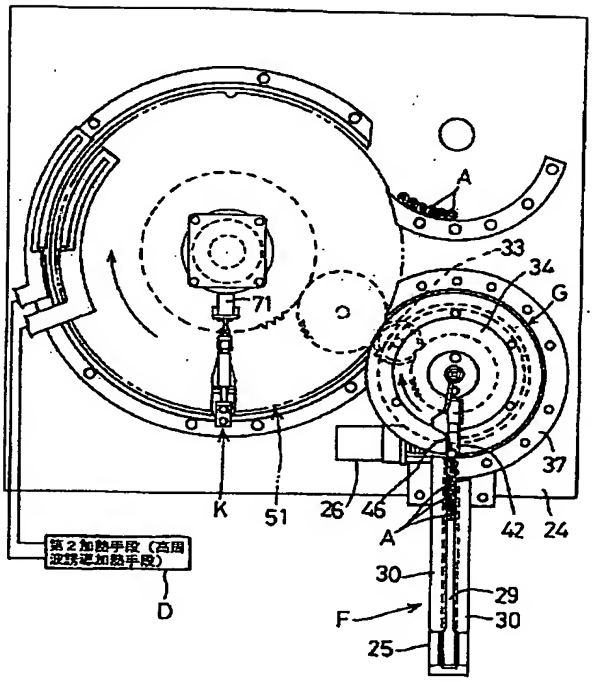
【図４】


(イ)
(ロ)
(ハ)
(ニ)
第１加熱手段
C
第２加熱手段（高周波誘導加熱手段）
D
20
20A
20B
21A
21
21b
21c
21B
6
A
5a
5
4
3a
3
2a
2
X
1
6c

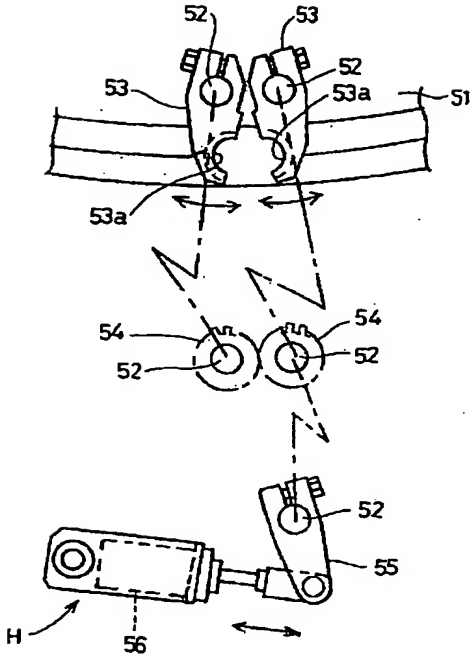
【図５】


(イ)
(ロ)
(ハ)
(ニ)
第２加熱手段（高周波誘導加熱手段）
D
22
22A
22B
22D
22C
6
A
5a
5
4
3
3a
2a
2
X
1

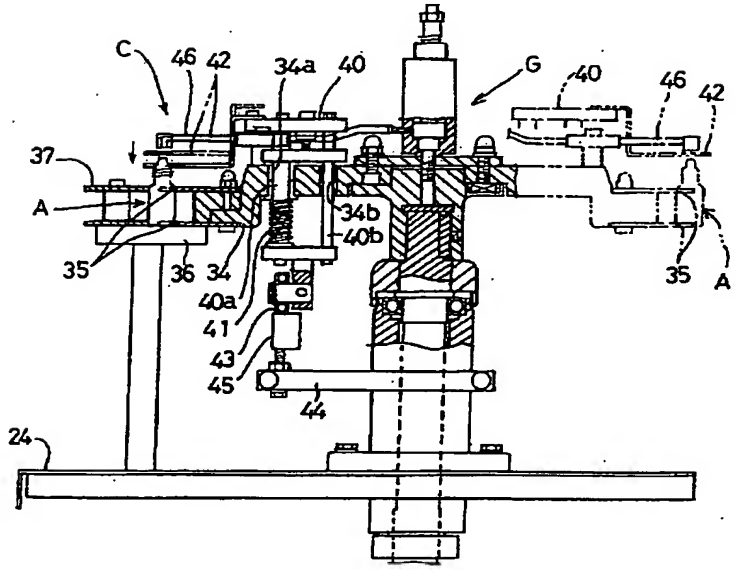
【図６】


A
33
34
G
71
37
K
51
26
46
A
42
24
第２加熱手段（高周波誘導加熱手段）
D
30
29
F
30
25

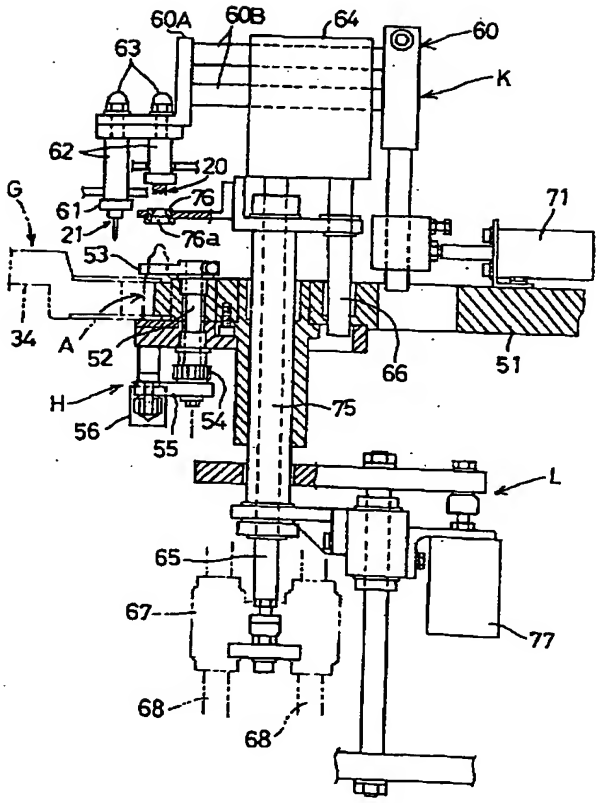
【図１０】


52
53
52
53
53a
51
53a
54
54
52
52
52
55
H
56

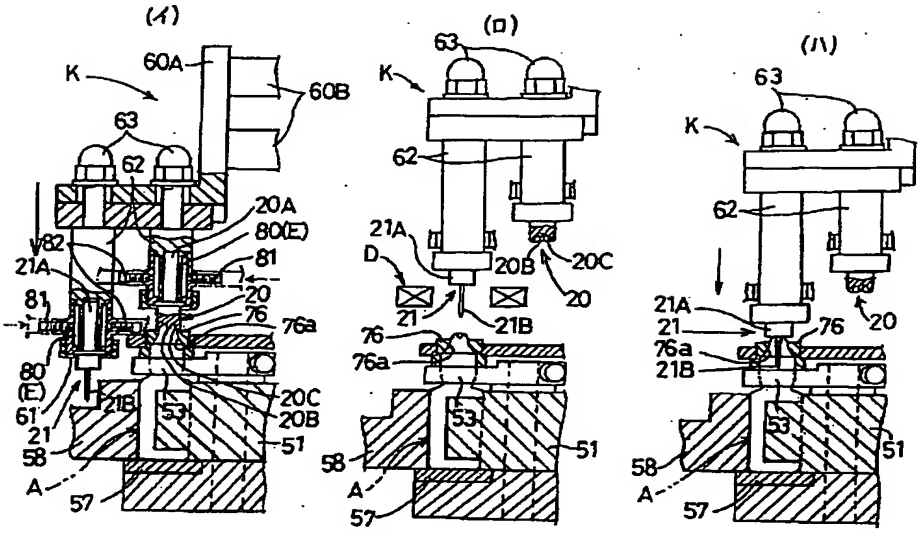
【図７】


C
46
42
34a
40
G
40
46
42
37
A
34b
40b
35
36
34
40a
41
43
45
44
35
A
24

【図８】


60A
60B
64
60
63
K
62
20
G
61
76
71
21
76a
53
34
A
52
66
51
H
56
54
75
55
L
65
67
77
68
68

【図１１】


(イ)
K
60A
60B
63
62
20A
80(E)
82
81
21A
20
81
76
76a
80
(E)
61
21B
20C
20B
21
53
51
58
A
57
(ロ)
63
K
62
21A
D
20B
20C
21
20
21B
76
76a
53
51
58
A
57
(ハ)
63
K
62
21A
21
76
20
76a
21B
53
51
58
A
57